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MUNICIPAL ENERGY REFORM PROJECT IN UKRAINE (MERP)

ANALYSIS OF INTERNATIONAL EXPERIENCE IN IMPLEMENTATION OF INCENTIVE-BASED REGULATION IN EU COUNTRIES IN WATER & WASTEWATER AND DISTRICT HEATING SECTORS

November 2015
This document was produced for review by the United States Agency for International Development (USAID).
It was prepared by the Municipal Energy Reform Project in Ukraine.

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REPORT

Analysis of international experience in implementation of incentive-based regulation in EU countries in water & wastewater and district heating sectors

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Prime Contract Number	AID-OAA-I-13-00015
Task Order Number	AID-121-TO-13-00006
Project Title	Ukraine MERP
IRG Project Number	120000.1000
Submission date	10 November, 2015

Executive summary

1. The report provides analysis of regulatory systems used in Bulgaria, Estonia, Latvia, Lithuania, Poland in the sector of district heating and in the sector of district water supply and sewerage with regard to incentive based regulation, totally 8 cases.
2. The analysis of the cases suggests the following comments of general nature:
   - There is[1] no case with a pure model of incentives regulation and no case with pure model providing no incentives at all;
   - Incentives regulation or a certain set of incentives elements is used in every country;
   - Particular package of incentives elements in place depends on what the country is challenged at, on historical evolution of regulatory praxis to the day, on degree of wide public trust/acceptance at regulatory decisions, etc.
3. The regulatory instruments of Regulatory Asset Base, Weighted Average Cost of Capital, limited Operating expenses, and Efficiency coefficient are used widely.
4. Regulatory Asset Base in majority cases is limited to the value of tangible asset used for the regulated activity in question; in majority cases, the regulating institution sets restricting provisions on inclusion of certain elements into the value of RAB.
5. In some cases, working capital is considered as part of capital invested for return on capital establishment.
6. In the majority of cases analyzed, there is a structure of debt/equity capital, pre-established by the regulating institution for the purpose of return calculation.
7. WACC is used for establishment of rate of return for the regulated activity in question, and CAPM is the most oftenly used method to determine price of equity. However, in very detailed level, countries have specific differences on this issue, and also, the practice differs on the way cost of debt is established. In some cases there is practice of limiting the maximum amount of WACC to be included into justified return. On the other hand, there are also provided in the Report examples of extra return portions for dedicated purposes as well.
8. The approach to regulating OPEX is diverse, from general sketches with imposing % limitations, to very detailed prescriptions and micromanagement practice. On the other hand, in some cases the real level of regulatory accuracy in practice is greater than it is described in legal acts, and the

[1] Within the array of cases analyzed.

proof to this observation are discussions with relevant regulatory experts and relevant analysis of price-setting individual decisions (reports).

9. Efficiency coefficient is understood in very diverse ways in analyzed countries, from highly detailed multiple elements model (water, BG) to straightforward of half-inflation rate (DH, LT).
10. As unique practice in DH sector, the Estonian LRAIC model is to be mentioned again, as a composite effectiveness reference, potentially releasing the regulatory institution from routine relatively small scale cost analysis and providing powerful incentives to entities to implement measures delivering attractive extra benefit.
11. Bulgarian practice with detailed focus on qualitative indicators' incorporation into price making regime, and doing it on individual basis, suggests that the regulatory objective of primary importance is ensuring the quality of regulated services through economic incentives. The improving situation on this regard would be the verification of the suitability of regulatory approach to the country's situation.
12. The Lithuanian practice of extra economic incentives (together with other factors, of course) have led the DH sector to fuel conversion by 50% during just 5 years. Regular consistency in efficiency targets towards heat losses in the networks (close linking of long term efficiency targets to long-term investment program) enabled to reduce by more than 50% of loss share during 10 years.
13. Polish regulatory system in DH is still relatively new and rapidly changing. It is reasonable to conclude by now, that Polish regulatory system, started with clear aspirations for "revenue cap" regulatory regime, now has signs of incorporating elements of "rate of return" regulation.
14. On the contrary, Latvian regulatory system is more "rate of return" than "capped" one.
15. At this stage it is reasonable to conclude, that mixed regulatory approach is prevailing in analyzed countries. Dependently on the needs of a particular country, the best echoing elements of incentive regulation shall be introduced, starting with consideration of Regulatory Asset Base, return model, limitations and efficiency requests in the area of operational costs, incorporating additional economic incentives dependently on general strategic targets of the sector to achieve over particular period of time.

Overview of incentive based regulatory approach

16. "Command-and-control is comforting to politicians and people: governments know what they are asking for, people know what they are getting, companies know what they are supposed to deliver; the only people who do not like it are economists." The Economist, September 2, 1989.
17. With this meaningful phrase to regulators, there are disclosed numerous risks of stepping away from pure cost regulation (or more modern version as cost-plus regulation), which was in place for decades in energy and other infrastructures regulatory agenda. However, the growing pressure to deliver better quality and higher value to consumers, quest for greater efficiency of the infrastructure sectors and acknowledging that critical impact that energy services have to the whole economy, also, evolving global regulatory thought and regulatory practice lead to changes in demanded output of national regulatory regimes.
18. Incentive based regulation is one of cited regulatory approaches, and here the Report provides details on the approach.
19. The formulation "**Incentive regulation can be defined as the implementation of rules that encourage a regulated firm to achieve desired goals by granting some, but not complete, discretion to the firm**"[2] provides the very essence of the Incentives-based regulation regime: companies behave exactly as it is expected under the stimulus they are supplied, or you take out what you put in.
20. This definitions comprehends three aspects:
    - **Regulatory goals must be specified clearly before incentive based regulation is designed** – the characteristics of regulatory programs will differ greatly accordingly to the goals that these programs are pursued to achieve;
    - **Regulated entity is granted some discretion under incentive based regulation** – for example the entity is rewarded for specified achievement (say, cost reduction), however, the entity is not instructed on the way how to complete the achievement (which cost items and which ways);
    - **Regulated entity is not granted complete discretion under incentive based regulation** – the regulating institution imposes some restrictions on activities and/or outcomes under incentive regulation.

[2] D.E.Sappington, D.L.Weisman. Designing Incentive Regulation for the Telecommunications Industry. 1996, American Enterprise Institute, 388 p.

21. The regulated entity's granting with partial and not complete discretion is due to the circumstances that (i) regulated entity is better informed than the regulator on the regulated industry characteristics[3], and (ii) the company has, as a rule, different goals from consumers or society at large[4].
22. If the regulating institution was as well informed about the environment of the industry, the company would have been simply supplied with detailed instructions on every aspect of operation. However, this is rarely the case, if it is possible at all. Therefore, it is generally possible to be gainful to all parties, when the company is able to employ its preeminent information to achieve the goals established by the regulator.
23. Diverging goals of the regulated company and its consumers or the society at large arise in almost all the aspects of the scene. The company is, first of all, serving the interests of its shareholders, but consumers pursue their own welfare objectives. Diverging goals give birth to diverging preferences, again, in nearly all the aspects of the company's operations (risks, costs, prices, quality, external effects, like pollution, tolerance, etc.). The uniformity of the goals is possible in the only case probably - if the company is pursuing society's goals and have no other goals at all, and only in this case the regulatory constraints are needless. However, this is mostly theoretical alternative as well, since any society consists out of different individuals having diverse views, and any company consists out of humans having their own interests either; and this makes the unanimity of society's and entity's goals more complicated and less likely to occur.
24. Competition in the market – real or potential, efficient or weak – is an important contextual factor to consider.
    - In general, efficient competition is able to reduce costs, drive prices down close to operational costs, deliver quality and value to consumers, introduce innovations, etc. In this regard, with regulation or with competition similar outcomes may be achieved, considering narrow approach;
    - Competition is not able alone to achieve long-lasting overall social goals, considering broad approach. Regulatory policies promote social goals where competition alone is not sufficient to achieve;
    - Combination of competition and regulatory policy is a sophisticated setting, and careful regulatory movements are needed not to distort the first and to implement

[3] Technology, cost structure, consumer preferences, future trends, etc.
[4] Profits – is the ultimate goal of any healthy company in the economy.

the second. The factor of competition adds up complexity to the regulatory policy in general and incentive regulation in particular.

25. This way wrapping-up, authors of regulatory economics propose, that incentive based regulation is applicable when competition alone is not sufficient to pursue social goals in the sector / market, the goals of entity and society are diverging, and the entity has superior information than the regulator has. And the challenge in this environmental context arises the following – to develop such a regulatory incentives' regime, that entity is concerned to use his superior information to achieve societal goals.
26. Elements of incentive driven regulation could be found among variety of regulatory methods, however, RPI-X is the one widely recognized as incentive-based regulation method. The following listing[5] demonstrates the elements in incentive regulation that might be employed by regulating institution under different regulatory regimes:
    - **Principal and agent method** - pursuing public interest objectives regulator (principal) has (almost) no information of entity's costs, and entity's costs in fact depend on entity's efforts and on random factors as well. Regulatory "contract" is drawn up, eliciting compliance of the entity to regulatory objectives. The agent[6] receives the entire benefit from his extra effort, and the principal[7] gets the rent independent of the outcome[8]. A "contract" representing a pure "franchise" arrangement, whereby the agent pays a franchise fee to the principal and then keeps the net result, gives strong effort incentives to the regulated entity to achieve as much benefit as it obviously can. This method is suitable to reach the allocative efficiency, since supplies the entity with incentives to operate cost-efficiently without close monitoring and to align entity's marginal revenue with society's marginal benefit[9] - the entity will behave as perfectly discriminating monopoly[10] and deliver socially efficient output at profit maximizing choice. However, social efficiency does not mean social fairness; on the other hand, this method still requires a great detail of information on society's

[5] M.Crew, D.Parker (eds.). International Handbook on Economic Regulation. 2006, Edward Elgar Publishers, 405 p.
[6] The regulated entity in this case
[7] The regulating institution, acting on behalf of consumers / society in this case
[8] Outcome to the agent / the regulated entity
[9] The rule for profit maximization
[10] A discriminating monopoly – entity, pricing every consumer individual price according to consumers' individual reservation values, operating single in the whole market, where consumers have no possibilities to trade between themselves; discriminating monopoly maximizes its economic profits and delivers allocative efficiency.

marginal value schedule for the entity's product and bargain efforts over fixed fee. The regulator can arrange the fee that eventually would drive the entity to competitive returns on its assets, but the information again has to be available in advance. Therefore this method is to be considered as more of theoretical nature for the nowadays environment.

- **Rate of return method** – by some authors is viewed as a form of "cost-plus" regulation, involving two steps. First, estimation of operating costs of the entity, and second, price setting to generate the revenues that are just sufficient to cover estimated operating costs plus reasonable return on investment. Advantages of the methods include the following: (i) by ensuring reasonable financial return, regulation secures adequate supply of services to consumers; (ii) by holding revenue close to costs, regulation helps to keep supply of regulated services (products) at affordable level. Potential risks include: (i) undermined entity's incentives to operate at cost-efficient way, however, in practice due to regulatory lag entity's incentives for cost reduction are present[11]; (ii) burden on regulator to investigate entity's costs structure – finding out costs information becomes the central problem for regulation under this method, draws the regulator into detailed highly specific discussions about production methods, and the danger on "regulatory capture" increases; however, in practice performance benchmarking or "yard-stick competition" are used to supply indirectly information on costs and to provide incentives for efficient operations; (iii) "inflated rate base" or Averch-Johnson effect might be employed by the entity to turn financially unacceptable rate to acceptable one, and more capital-intensive methods introduced, when price reductions and profit limits are established; in practice, the possibility of "inflated rate-base" option requires highly critical attention from regulating institution; (iv) limiting financial incentives to develop and introduce to the market new products (services), since financial incentives usually are not enough attractive to bearing the risks of discovering and fulfilling consumers' new needs.
- **RPI-X method** – the method under which a regulated price is set for a specified service or a weighted average basket of services for a given period of time. The regulated entity is then permitted to change this price by the rate of increase of retail price

[11] Cost reductions are passed to consumers not immediately in the form of lower prices but after intermittent rate hearings. This way the entity can benefit temporarily from cost reductions between two rate cases.

index (RPI)[12] minus negotiated factor X, which represents the anticipated productivity improvements in excess of the national average. This establishment is close to fixed price arrangement, where the consumer gets assured result while the supplier takes the risk and receives rewards from additional effort or from cost reduction applications. The method does not provide fully efficient outcome, since marginal social value is not reflected. Originally RPI-X method was developed for privatized utilities to prevent from exploiting their monopoly power in the short to medium term, while competition was expected and encourage in the long term. It is recognized that RPI-X regulation for long term has weakened incentives, due to the fact that "the contract" is renegotiated at the end of regulatory period, and the new price cap and the new X value are related to existing profits and to rates of productivity improvement achieved in the past. The reliance on past achievements compromises incentives – at the end of regulatory period entity has incentives to delay productivity improvements that might affect their bargaining positions for the next regulatory period, i.e. the entity has incentives to use its informational superiority over regulating institution to exaggerate its costs and to transfer to the next regulatory period. On the other hand, if changes in services basket take (or are taking) place, the entity has incentives to focus central negotiating problem to the "output" composition instead of focusing on cost improvements. RPI-X provides more scope for bargaining practices. With long-living and specific investments made, entities become vulnerable if (i) price reviews occur too frequently, (ii) new prices do not provide sufficient coverage to the investment already made and not a sufficient return, (iii) regulator does not resist political pressure to make prices lower, to keep them low, to "claw back" past profits. This vulnerability leads (iv) entities to employ more debt instead of equity, since external bondholders are more respected, usually. It is recognized that ability of governments and respectfully regulators to credibly keep commitments far into the future is weak and constitutes significant problem[13].

- **X factor** – establishment might be conducted under several options:

[12] or might also be CPI – consumer price index.

[13] It is not every time the case that a promise not to intervene within regulatory period is reliable and can be effectively trusted.

- first, X-factor to be set equal to the annual expected or target growth rate of the total factor productivity (TFP) in the entire sector.
- second, X-factor to be set equal to the annual target change in productive efficiency for each individual entity; the regulator can set differentiated price caps based on the entity's efficiency performance estimated from a benchmarking analysis, i.e. measuring a entity's productive efficiency against a reference performance.
- Both options here imply, that relatively inefficient entities can benefit much more than already efficient entities that cannot further improve their productivity. Thus way, there is risk of inducing undesired incentive effects.
- third, X-factor to be set at decomposing the TFP growth into two components: one due to technical progress and the other related to the firm-specific efficiency improvements. The X-factor for each company is then taken as the sum of the first component (common for the entire sector) and the annual target change in the company's efficiency. This approach has the advantage that it tailors the price caps to individual companies' performance.

- **Profit sharing method** – the RPI-X regulation method is in principle designed to provide strongest incentives to encourage profit-seeking behavior, however, in practice profits in excess of some limit are subject to heavy public pop criticism. This critique led regulators to develop an explicit element of profit sharing to be included into regulatory contract as an integrate element, which enables to transfer a part of profit to consumers through automatic price adjustments[14]. Profit sharing mechanism designers are in all cases bounded with policy process and careful not to remove efficiency incentives by establishing rigorous price sharing scheme.
- **Franchising method** – bidders would compete with each other to supply the entire market at a certain price for a given franchise term. The franchise is awarded with the given the lowest price. The incentives for efficiency are similar to price cap regulation,

[14] Simple tax on the profit practices would not lead to changing pricing and output decisions by the regulated entity, but transfer part of the monopoly profit to government solely. Sliding scale schemes on monopoly profits can be designed as to make impact on decisions about pricing and output by the entity.

but the price cap set by a competitive process rather than by a bilateral bargaining. As a positive aspect of the method is recognized the making the market competitive at specified intervals, even if the sunk costs prevent the market from being competitive on continuous basis, however, it is numerous challenges arise after the franchise term is over. Franchising is considered as the regulatory method (i) providing strong incentives to entity for extra efforts to reduce costs and operate efficiently, since all the marginal profits stays with the entity, (ii) revealing regulator with relevant information about cost conditions of the industry, since franchising provides price quotations. From variety of risky aspects, some here to mention: (i) risks to drive away higher quality proposing bidders and give preference to lower quality entities, if true quality is ex ante hidden from franchisor, (ii) bidders might propose prices lower than costs counting on further renegotiation of terms of supply if the first mover advantage is inherent to particular market, and further "waste" of capital is unacceptable or more costly than renegotiation, (iii) in practice, for long-term agreements, the administrative apparatus becomes very much similar to the one for traditional regulatory practices.

27. While developing the incentive based regulatory scheme, a number of key issues must be addressed[15], to maximize the economic benefits[16], to adjust terms of service provision to future cost and demand fluctuations, to share the economic surplus of the "relationship". To be noticed, firstly, the elements to be included in the incentive regulation plan are the following:
    - **Services under the scheme**, partial (subset of entity's activities) or comprehensive (all the activities of the entity);
    - **Tightness of the link between revenues and costs**, or extent to which revenues of the entity track its own costs. In mathematical expression, $Revenue = a + b * Costs$, the objective is

[15] Incentive Regulation for Public Utilities. M.E.Crew (ed.). 1994, Springer Sciences and Business Media, NY, 213 p.
[16] A list of factors that have impact on the size of economic benefits to be created:
Static productive efficiency – producing at lowest expected and possible cost.
Dynamic productive efficiency – innovation and cost reductions over time.
Allocative efficiency – set of prices maximizing consumer benefits with the set of services offered by the entity.
Transaction costs – the least possible and well considered in advance.
Administrative process simplicity – to avoid the administrative burden to grow costly and complex.
Measured data – measured easily and transparently, to prevent the cost of monitoring the performance of the regulated entity to grow excessively.

to set factor b, at the level between[17] $0 < b < 1$. Price caps (as index to historical base) and yard-stick competition (as index to performance of peers) are two different ways of separating entity's revenue from its costs; and neither sets prices on entity's own current period costs, however, are able to guide setting of factor b, using cost-sharing or profit-sharing plans;

- **Rate review frequency**, impacts both administrative costs of rate review and incentives of entity. Full rate review is costly, however, allows to keep reasonable relationship between prices and costs; indexing on the other hand allows less frequent reviews and prevents gross divergences between prices and costs and the consequent loss of allocative efficiency. Yard-stick competition automatically incorporates any cost changes that affect the all the yard-stick entities jointly. Regulatory lag either affects the dynamic power of incentive plan[18];
- **Price adjustment constraints at price review**, prices in fact are never set on current costs, and this "informational lag" using schemes can create a "ratchet effect" driving the entity towards efficient pricing over time, even when regulator has very limited abilities to monitor the true cost curve of the entity. To achieve this, regulator shall consider adjustment plans that prevent the extrapolation of inflated, purposefully by the entity, costs.

28. Developing the incentive based regulatory scheme, the timing shall be kept in mind - the regulation terms could be set before or after the regulation period. In *ex ante* regulation the entity's financial records in previous years are used to set the regulatory scheme namely price/revenue caps or budget limits at the beginning of the period. In *ex post* regulation on the other hand, the regulator examines the entity's expenditures and revenues during the regulation period and compensates them accordingly. The *ex post* regulation allows a more flexible approach and therefore is not able to provide as high-powered incentive mechanism as in *ex ante* regulation.
29. Incentive based regulation does not in fact assume that costs and demand are given or known, on the contrary, it shall be designed to provide adequate incentives to discover them by the entity,

[17] Weakest or rather no incentive when b=1, that is costs are passed directly to price (consumers) and the entity is not bothered to engage in efficiency activities. The entity is price-maker.
Extreme of highest incentives at b=0 represent the entity of being out of control for its revenues and profits depend only on the amount to which costs are reduced. The entity is price-taker, as in fully competitive environment.
[18] For example, 10-years regulatory lag would be a high-incentive-powered scheme in the case of b=1, and 1-year regulatory lag would create weak incentives at scheme of b=0.

when regulatory goal is to stimulate alertness to lower cost techniques and hitherto unmet demands.

30. Finally and concluding the first chapter of the report, the below there listed myths that are strolling on incentive regulation.

Table #1. **Myths on incentive based regulation**

Myth on incentive based regulation
Myth 1. Incentive regulation is best viewed as a one-size-fits-all proposition; an incentive plan that performs well in one setting will always perform well in other settings.
Myth 2. The more performance measures included in an incentive regulation plan, the better the plan will perform.
Myth 3. Incentive regulation plans should base the entity's financial rewards solely on the entity's performance on the dimension of primary concern to the regulator.
Myth 4. Incentive regulation plans that provide the regulated entity with a choice among compensation structures are worse for consumers than plans that provide no such choice.
Myth 5. Incentive regulation is a zero-sum operation: any gains for the regulated entity necessarily come at the expense of consumers.
Myth 6. Substantial earnings by the regulated entity under an incentive plan constitute strong evidence that regulators were lax either in formulating or implementing the plan.
Myth 7. Designing incentive regulation plans and competitive entry policies are completely independent tasks. Furthermore, a regulator's incentive to promote competitive entry is not influenced by the structure of existing regulatory policy.
Myth 8. The regulated firm is always better off under pure price cap regulation (in which earnings are not shared with consumers), while consumers are always better off under forms of price cap regulation that mandate earnings haring.
Myth 9. Absent direct evidence of harm caused by asymmetric regulation (that is, treating different competitors differently), it is safe to assume that no such harm has occurred.
Myth 10. Lower prices, lower production costs, and higher network investment under incentive regulation regimes constitute conclusive evidence that incentive regulation "works".

According to Sappington, Weisman

31. Evolving regulatory thought and historical path of development of regulatory practices, however, suggest, that numerous countries use regulatory regimes that cannot be attributed to "pure" academic regulatory types, but rather mixtures of elements from different types of regulatory regimes, proving this way that "tailored approach" prevails[19].

[19] This at least partially might be also related to the internationally recognized issue, that regulators are likely to be risk averse. As noted by OECD "… the failure of a non-traditional approach is likely to have more serious consequences for the regulator than a failure of traditional regulation..." (OECD, 2002, p. 53). This perception of risk is a critical factor impeding the more widespread consideration and use of alternative instruments. In such traditional sectors as energy, and especially – municipal infrastructures, deviances from cost-plus regulation or even solely-cost regulation in often cases would be considered as non-traditional and therefore more risky regulatory practices.

Incentive based regulatory elements in Bulgaria, by KEVR. Drinking Water Supply and Sewerage Utilities

32. The Ordinance for the regulation of prices for water and wastewater services (thereafter – The Methodology for the Bulgarian chapter) is the guiding document for KEVR to determine tariffs for a variety of district water services, including:
    - **Drinking water supply to consumers**,
    - **Wastewater collection**,
    - **Wastewater treatment**,
    - **Connection of users to water supply system**,
    - **Connection of users to sewerage system**.
33. The drinking water supply and sewerage services are subject to **changing regulatory regime** in Bulgaria. The regulator declares, that for the period 2006-2008[20], there was the "rate of return" regulatory regime in place; for the period 2009-2013[21], there is the "price-cap" regulatory regime in applied; for the next period of 2016-2020[22] there is planned "price-cap" regulatory regime as well. The changing approach is well seen in the Methodology, which entails provisions of both regulatory systems.
34. The Methodology provides rules for calculation prices as for **"cost-plus" manner**:
    - KEVR follows the process of the following:
        - analysis and assessment of factual and forecasted data, accordingly to the approved by KEVR business plan of the entity,
        - verification of the parameters of the business plan and the price project;
        - approval of estimated annual revenue accordingly to the approved by KEVR business plan of the entity, including economically justified operating costs and return on capital;
        - approval of corresponding prices;
        - determining the duration the regulatory period and the values of the factors to which prices changed during the regulatory period.

[20] Regulatory period - 3 years' length.
[21] Regulatory period - 5 years' length, and is extended by 2 more years.
[22] Regulatory period - 5 years' length.

- The prices are approved taking into consideration the information of results for the base year[23], which is the previous calendar year;
- The prices are approved accordingly to the overall performance of the business plan of the entity – individualized approach, tailored to every entity's specific situation;
- The Methodology states, that KEVR shall apply method of regulation - "rate of return on capital" ("cost plus")[24], whereby KEVR monitors actual revenue values and the components; regulatory period is not less than one year; and next regulatory period might be initiated if significant divergence is observed between regulatory and actually incurred costs and return; during the regulatory period, prices may be modified at the impact of factors, which was not possible to predict at approval of prices;
- The Methodology states, that based on the achieved levels of quality indicators by the entity, there are established next annual target levels of quality indicators, and accordingly established needed revenue and prices levels ensure the achievement of these quality levels;
- The annual revenue is calculated as the formula provides:

$$R = C + (RAB * RR),$$

$where$

R - annual revenue for the entity,

C - annual recognized costs for the entity,

RAB - regulatory asset base for the entity,

RR - rate of return for the entity,

- The Methodology provides types of costs that shall not be included:
  - costs not associated with the provision of regulated services;
  - expenditure for which the Commission reasonably assumes that are not in the interest of consumers, or which are not necessary for the performance of regulated activity the entity; costs of donation and unused holidays costs; running costs or obligations to reduce the carrying value of inventories;

[23] The Methodology provides the term "Base year"- is the previous calendar year or 12-months period, prior to submitting the entity's proposal, for which the information on regulated activities is used as the basis to determine prices.

[24] Both are referred interchangeably

- corporate income tax; financial, extraordinary expenses; deferred expenses;
- sanctions and / or fines; interest for delay, penalties and other payments related to default contracts.

35. The Methodology provides a set of **elements** for **incentives based efficiency** efforts for entities:

- The Methodology states, that KEVR shall apply method of regulation – "price cap", whereby KEVR approves prices for the first year of the regulatory period, and adjusts the prices yearly, according to inflation index and efficiency factor; regulatory period is 3 to 5 years; the "price cap" regulatory formula is the following:

$$P_t = P_{t-1} * (1 + I_t - E_t),$$

$where$

P_t - price for individual service for year t,

I_t – inflation for year t,

E_t – efficiency factor[25] for year t.

- The Methodology states, that KEVR shall apply method of regulation – "revenue cap", whereby KEVR approves revenue for first year of the regulatory period, and adjusts the revenue yearly according to the inflation index, efficiency factor, difference between established revenue and collected revenue due to changes in quantities of services sold; regulatory period is 3 to 5 years; the "revenue cap" regulatory formula is the following:

$$R_t = R_{t-1} * (1 + I_t - E_t) +/- Z,$$

$where$

R_t - revenue[26] for the entity for year t,

I_t – inflation for year t,

E_t – efficiency factor[27] for year t,

[25] The Methodology provides the term as: "is the target value improving the efficiency of water and sewerage entity, set by regulator".
[26] The Methodology provides the term as: "is the income needed by the entity for providing the level of service and the allowed rate of return".
[27] The Methodology provides the term as: "is the target value improving the efficiency of water and sewerage entity, set by regulator".

Z – difference between established revenue and collected revenue due to changes in quantities of services sold.

- The base year is the same – 12 months period before new regulatory period;
- The rate of return is provided as WACC on RAB;
- The Methodology states, that revenue adjustment for each year within the regulatory period depends on the performance of the entity towards target levels for the quality indicators; in the case the entity does not reach the target levels, the revenue for the next year is accordingly reduced;
- While making annual adjustments, the Inflation index is taken as published by National Statistics Institute, it is applied to fixed costs, however, it is not applied to depreciation costs;
- While making annual adjustments, the Efficiency coefficient is applied to fixed costs, however, it is not applied to depreciation costs;
    - the Instruction[28] provide, that Efficiency coefficient[29] is based on the duration of the regulatory period, the full implementation of the approved business plan of the entity, data on the achieved efficiency, performance data of other entities, macroeconomic data for the period, other factors affecting the operation in question. For the first regulatory period the efficiency rate (X) will be determined and applied to the level of permissible inflation index;
    - the Instruction-2[30] provides, that the values of annual targets are formed according to the available information on status quo of indicators and taking into account objective factors influencing activities; taking into account expected results from investments foreseen in business plan;
    - the individualized approach to the entity, its business plan and results achieved is consistent also though the composite achievement measure, which is expressed via formula below:

$$K = \sum_{i=1}^{n} (\delta_i * K_i) = \sum_{i=1}^{n} \left(\delta_i * {K_{i,achieved}}/{K_{i,targeted}} \right),$$

[28] INSTRUCTIONS to formation of prices of water supply and sewerage services at a price calculated by the "price cap"

[29] Efficiency coefficient development in Bulgaria will be analyzed in detail in the Report under Subtask 1.3

[30] INSTRUCTIONS for the implementation of the regulation on long-term rates, forming the annual target levels of quality indicators for water supply and sewerage

$where$

K - composite achievement measure,

$i(1;n)$ – number of performance indicator,

δ_i - weight of a particular indicator i,

K_i – achievement coefficient of a particular indicator i.

- the weights and indicators are provided in table #2 Weights and performance indicators, in Bulgaria, used to incentive based regulatory program below.

36. Some **aspects of RAB**:
    - Concept of RAB – RAB includes (i) value of asset that is useful and used for provision of regulated services, plus (ii) necessary working capital[31], plus (iii) projected average amount of investment[32], approved by KEVR accordingly to the business plan of the entity, minus (iv) accumulated depreciation of the asset value for the past periods, minus (v) value of asset acquired gratuitously;
    - Value of RAB is taken as the value for the end of the respected year;
    - Limitation of RAB are the following: value of asset under construction; assets under finance lease if they are not related with regulated activities; asset not used for regulated activity, under conservation, written off, given for lease, other; asset acquired via donations, grants, and grant schemes, or financed by other users; value of assets acquired in previous periods that exceed the market rates for similar assets; assets having residual value during the regulatory period;
37. Some **featuring characteristics** of the Methodology, for the purpose of delivering the complete view[33], shall be mentioned:
    - **Losses**, at their maximum amount, for each entity is established by decision of KEVR at approving the business plan; at calculating the price, maximum allowable losses reduce the projected amount of regulated services to be sold over the regulatory period.

Table #2. **Weights and performance indicators, in Bulgaria, used to incentive based regulatory program**

[31] Calculated and approved by KEVR, according to (consumer debt plus inventory size minus supplier debt) multiplied by working capital turnover cycle length.
[32] Calculated as average yearly investment value over the whole regulatory period.
[33] Respecting the discussion with MDI local experts, on 12th-14th October, 2015.

#	Indicator	Weight		Description of the indicator
		entire	partial	
1	Penetration (coverage) of water supply	4	4	Ratio of Population served by the entity to Population inhabited in the territory of the entity
2	Drinking water quality	8	3	Ratio of Number of samples meeting regulatory requirements (physiochemical parameters) to Total number of samples taken
			5	Ratio of Number of samples meeting regulatory requirements (microbiological parameters) to Total number of samples taken
3	Continuity of water supply	5	3	Ratio of Number of population affected by disruptions of water supply to Total number of population served by the entity
			2	Ratio of Planned interruptions in water supply, resumed in within the prescribed period, to Total number of planned outages
4	General water losses in water supply system	10	5	Ratio of Water supplied into the system to Water supplied to inlets
			3	Average time to localize leaks
			2	Average time to eliminate leaks
5	Accidents in water supply system	6	2	Ratio of Annual number of accidents to the Length of water bringing aqueducts (network)
			1	Ratio of Annual number of accidents to the Length of water distribution network
			2	Ratio of Annual number of accidents on the water supply branches to Total number of water service connections
			1	Ratio of Annual number of accidents at the pump stations to Total number of pump stations.
6	Pressure in water supply system	7	5	Ratio of Number of water supply branches where risk of water supply with a pressure lower than the normative to General number of water service connections, served by the entity
			2	Ratio of Number of water supply branches where risk of water supply pressure higher than the normative to Total water service connections, served by the entity
7	Penetration (coverage) of sewerage	4	4	Ratio of Population served by the entity to Population inhabited in the territory of the entity
8	Quality of sewerage	5	3	Ratio of Number of samples meeting regulatory requirements to Total number of samples taken
			2	Ratio of Annual waste water purified by wastewater treatment plants (WWTP) to Total project capacity of the WWTP
9	Accidents in sewerage system	4	2	Ratio of Annual number of accidents to Number of building sewer connections
			2	Ratio of Annual number of accidents over the length of sewerage network
10	Flooding of regulated land, owned by third parties	2	2	Ratio of Area of land, owned by third parties, affected by sewage flooding to Total area of the settlement served by the entity
11	Exploitation efficiency indicators	33	1	Ratio of employees at water supply activity of the entity to Total number of buildings connected to the system
			1	Ratio of employees at sewerage activity of the entity to Total number of buildings connected to the system
			2	Ratio of Annual number of accidents to Total number of personnel providing water and sewerage services

			5	Ratio of Number of meters installed at water sources to Total number of water sources
			4	Ratio of Number of settlements with measurement of water at the entrance of the settlement place to Total number of settlements served by the entity
			3	Ratio of Number of inlet meters installed, the total number of buildings connected
			4	Ratio of Annual number of water meters, passed the inspection, to Total number of water meters installed
			1	Ratio of Annual number of employees of the entity that attended qualification / training to Total number of employees
			1	Ratio of Number of water supply pump stations, with local automation system, to Total number of water supply pump stations
			4	Ratio of Number of water supply systems with automated management system to Total number of water supply systems
			0,5	Ratio of Number of elements with automated management system at water supply to Total number of elements at water supply system
			1	Ratio of Number of water treatment plants with automated management system to Total number of water treatment plants
			1	Ratio of Number of sewage pumping stations, with local automation system, to Total number of sewage pumping stations
			1	Ratio of Number of sewerage systems with automated management system to Total number of sewerage systems
			1	Ratio of Number of elements with automated management system at sewerage to Total number of elements at sewerage system
			0,5	Ratio of Number of sewerage treatment plants with automated management system to Total number of sewerage treatment plants
			2	Ration of Number of hours of working with chlorine to Total annual number of hours
12	Financial efficiency indicators	6	1	Ratio of Operating expenses to Operating income
			0,5	Ratio of Expenses to compensation and benefits to Costs of the activity
			1	Ratio of Operating expenses to Amount of water supplied to water supply system
			1	Ratio of Operating expenses to Invoiced water quantities
			0,5	Ratio of Electricity annual consumption to Invoiced amounts of water
			1	Ratio of Electricity cost to Operating expenses
			1	Ratio of Uncollected revenue for the year to Operating income of the year
13	Timing of response to users complaints	2	1	Ratio of Number of written complaints to Total number of users served by the entity
			0,5	Ratio of Number of submitted written complaints that have been answered in 14 days to Total number of complaints submitted

			0,5	Ratio of Number of submitted written complaints that have not been answered to Total number of complaints submitted
14	Timing of connection of new users to sewerage system	2	1	Ratio of Number of requests fulfilled within the prescribed period to Total number of received applications for connection to the water supply system served by the entity
			1	Ratio of Total number of requests fulfilled within the prescribed period to Total number of received applications for connection to the sewerage system served by the entity
15	Personnel to number of users	2	1	Ratio of Total number of personnel providing water supply services to Total number of users served by the entity
			1	Ratio of Total number of personnel providing sewerage services to Total number of users served by served by the entity

Incentive based regulatory elements in Lithuania, by VKEKK.

Drinking Water Supply and Sewerage Utilities

38. The Methodology for Price Setting for Drinking Water Supply and Sewerage Treatment (thereafter – The Methodology for the Lithuanian chapter) is the guiding document for VKEKK to determine tariffs for a variety of district water services, including:
    - **Drinking water supply** – activity of an entity, including means of technical, organizational and economic nature, to extract, process, transport and sell to consumers and subscribers;
    - **Sewerage treatment** – activity of an entity to collect waste water, store, transport, process, meter, analysis, release to environment and (or) management the sludge residual after processing;
    - **Surface runoff treatment** – activity of an entity to collect surface runoff, transport, process, meter, release, primary process of slime.
39. The general principles guiding the Methodology are the following:
    - "cost recovery" principle,
    - "polluter pays" principle,
    - "following efficiency criteria",
    - "affordability" principle.
40. The Methodology instructs to conduct **accounting separation** by regulated entities, and foresees **ABC model**[34] for accounting separation. Accounting separation model provisions request the entities:
    - to allocate revenues, costs and long term assets into separate into 5 business units:
        - drinking water supply business unit - within this business unit, including purchased water, the following services shall have separated accounts: (i) drinking water extraction, (ii) drinking water processing, (iii) drinking water transportation (including by vehicles);
        - sewerage treatment business unit – within this business unit, the following services shall have separated accounts: (i) sewerage collection via centralized network, (ii) sewerage transport via decontamination and vehicles, (iii) sewerage processing, (iv) sludge management, (v) surface runoff treatment;

[34] Activity Based Costing

- metering surveillance and consumer service business unit (Sales business unit);
- other regulated activity business unit – regulated by VKEKK activities under other Laws, but not under Law of Drinking Water; every regulated activity shall have a separate business unit;
- non-regulated activity business unit – neither under the Law of Drinking Water, nor under other Laws; all activities shall be collected in this business unit as one;

- to conduct direct allocation of revenue, referring to billing system, to business units and relevant services within;
- to conduct allocation of long-term assets, to business units and relevant services within:
  - directly, when a long-term asset is used for provision of a certain service;
  - indirectly, only if direct allocation is not possible and long-term asset is used for provision of several services (joint usage), to conduct allocation of long term asset among different services accordingly to the extent of the asset is used for provision of the service in question;
  - proportionally, when long-term asset is used for general activities and is not related neither directly nor indirectly to any particular service, the allocation of such a long-term asset is conducted proportionally to the value of previously directly and indirectly allocated assets' value;
- to conduct allocation of costs[35] to business units and relevant services within:
  - direct allocation – when the arise of the cost and to certain amount is due to provision of certain service;
  - indirect allocation – when arise of the cost is due to provision of several services and / or due to inside process or group of inside processes; cost drivers shall be used for indirect allocation of costs;
  - proportional allocation – when arise of the cost is due to general support activities of the entity, to ensure continuity, safety and stability of the entity's organizational activity; costs under proportional allocation are limited to 10% of costs allocated directly and indirectly; the allocation is conducted proportionally to the value of previously directly and indirectly allocated costs;

[35] Groups of costs are presented in Table#3 below.

- non-allocation – when costs are one of the following: bad debts, fines, penalties; support, charity, education; bonus (tantième); membership, entrance fees; interest on credits; representation; advertisement, marketing, informational activities, except the portion obligatory under legal requirements; costs for long-term asset liquidated, written-off, preserved, being at reserves; construction on going; depreciation (amortization) for the share financing the assets with EU funding, subsidies, dotation; depreciation (amortization) for the share of asset revaluation; depreciation (amortization) for financial asset, investment asset, prestige; depreciation (amortization) on the asset under development before exploitation is started;

41. The Methodology provides **long-term[36] base price mechanism with annual revision**.
42. While setting **long-term base prices**, it shall be respected:
    - The factual amount of costs allocated to relevant business units and relevant services over the last year of the current regulatory period;
    - The factual amount of provided relevant services over the last year of the current regulatory period;
    - The values of relevant indicators determined by comparative analysis (except for services of surface runoff treatment):
        - If efficiency of the relevant group of entities is higher than the efficiency of the entity in question, in this case the entity is established with the amount of particular costs, corresponding to the efficiency of his group, taking due consideration to the factors provided in the Description of comparative analysis[37], taking due consideration to the measures provided by the entity in the action plan to reduce those costs, taking due consideration to the time period for the entity to achieve the group efficiency level of the particular indicator;

[36] Long-term base price if established for 3 years.

[37] Description of comparative analysis for activities of drinking water supply and sewerage, provides: "Having evaluated the average Indicators of the Group, and having identified, that the Indicator of the Entity is worse than the average Indicator of the Group, to which the Entity belongs, the mandatory costs of the Entity are calculated, taking due consideration to the average Indicator of the Group, taking due consideration to the specifics of the Entity's activities, quality of the drinking water supply and sewerage treatment services and variety of the services provided, grounds of the costs in question to appear, necessity of the costs in question; the Entity is as well established with assignments for efficiency to be achieved in his operations. If the Indicator of the Entity is better than the average Indicator of the Group, to which the Entity belongs, the mandatory costs of the Entity are not increased to correspond the average Indicator of the Group, but rather the Entity might be established with assignments for efficiency to be achieved in his operations, taking due consideration to the facts aforementioned above and taking due consideration to the best value of the Indicator within the Group."

- If the efficiency of the entity in question is higher than efficiency of the relevant group of entities, the factual amount of particular costs of the entity is established;
- The mathematical expression of the incentive established by the Methodology is the following:

$$C_{i,t+1}^{E} = C_{i,t}^{E}, if\ C_{i,t}^{E} < C_{i,t}^{B}$$

$$C_{i,t+1}^{E} = C_{i,t}^{B}, if\ C_{i,t}^{E} > C_{i,t}^{B}$$

$where$

$C_{i,t+1}^{E}$ – particular cost i for the entity E for the next period t+1,

$C_{i,t}^{E}$ - particular cost i for the entity E for the last period t,

$C_{i,t}^{B}$ - particular cost i according to benchmarking result for the last period t.

- The cost types, that are subject to this efficiency test, are the following: (i) purchase of drinking water, (ii) purchase of sewerage processing, surface water treatment services; (iii) maintenance / repair works and materials for exploitation; (iv) maintenance / repair works, outsourced; (v) personnel, salaries; (vi) purchase of electricity for technological purposes;

- The planned changes in the operations of the entity during the first year of the regulatory period; overall changes expected after the long-term activity and investment program is implemented, with respect to cost amount and rate of return;
- The significant circumstances occurred after the submission of the project to VKEKK;
- The reasons, explained by the entity, of the cost changes;
- The general formula of the costs to be included into the annual revenue amount for the next regulatory period:

$$NC_y = \sum_{i=1}^{n} C_{y,i} + R_y \quad ,$$

$where$

NC_y – annual amount of costs to be included into price of a relevant service y, at the next regulatory period; this equals to annual amount of revenues to be collected at provision of service y, at the next regulatory period;

y – relevant service;

R_y – annual amount of return on capital to be included into price of a relevant service y, at the next regulatory period;

$C_{y,i}$ – annual amount cost i to be included into price of a relevant service y, at the next regulatory period; cost i constitutes relevant selection among the following: (i) purchasing of drinking water; (ii) purchasing of sewerage treatment services; (iii) depreciation (amortization) costs; (iv) costs for maintenance and for exploitation materials; (v) outsourced works and services; (vi) costs of technology materials; (vii) cost for electricity; (viii) fuel costs; (ix) heat costs; (x) personnel costs; (xi) tax costs; (xii) financial costs; (xiii) lease of property costs; (xiv) other allocative costs.

- Biased limits for:
  - loss of drinking water up to inlet into a building – established as factual percentage, however, not exceeding 20%;
  - infiltration of sewerage networks - established as factual percentage, however, not exceeding 20%, or not exceeding 35% in the case of mixed sewerage;
  - loss of drinking water in the building's inside system - established as factual percentage, however, not exceeding 10%, or not exceeding 5% in the case a remote metering system is installed; if the remote system is installed partially in the served territory, in this case effective amount of losses shall not exceed weighted average level, computed for 10% for traditional metering system houses and for 5% for remote metering system houses.
- The established WACC (under established structure of capital at 30% equity and 70% debt), however, in any case return on capital not exceeding 5% of the costs for a relevant service;
- The general formula of price determination:

$$K_y = {}^{NC_y}\!/_{Q_y} \ ,$$

where

Q_y - annual quantity of a relevant service y, at the next regulatory period;

K_y - price for a relevant service y, at the next regulatory period.

43. Summarizing the **incentives** package **at the phase of long-term base price establishment:**
    - strong incentives to reduce those entity's costs that are above the benchmarked level, in order not make loss (or rather not to cover those cost difference out of entity's return);
    - incentives to reduce costs that are below the benchmarked level and therefore established as they are at factual size, to make extra benefit;
    - strong incentives to reduce percentage of losses down to relevant limiting levels, in order not make loss (or rather not to cover those cost difference out of entity's return); extra reduction of losses (below limiting level) during regulating period produces extra benefits for the entity;
    - incentives to invest into infrastructure development using regular financing sources, since extra capital invested generates extra return; however, the limit of 5% to costs amount reduces the incentives to invest;
    - economic incentives to invest into infrastructure development using EU funds and other subsidies are weak, since no return is provided for the share of subsidies' capital.
44. While conducting **annual revision of base prices**, the following factors are respected:
    - Efficiency coefficient, estimated as half on annual inflation rate[38], but not exceeding 3%; efficiency coefficient is applied to total amount of costs, excluded depreciation (amortization) costs and return on capital;
    - Difference in the volume forecasted and the volume factual, of sold services – is reflected in revision;
    - Difference in the forecasted costs for relevant water or sewerage services purchases and the factual costs of these – is reflected in revision;
    - Difference in the forecasted costs for electricity and the factual costs – is reflected in revision;
    - Difference in the forecasted costs for heat and the factual costs – is reflected in revision;
    - Difference in the forecasted costs for technology fuel and the factual costs – is reflected in revision;
    - Difference in the forecasted costs for taxes and the factual costs – is reflected in revision;
    - Difference in the forecasted return on capital and the factual return, also, extra return on extra invested capital – is reflected in revision;
    - Impact of other factors that are out of control of the entity - is reflected in the revision.
45. Summarizing the **incentives** package **at the phase of base price annual revision**:

[38] Inflation rate is taken as CPI [Consumer price Index], published by National Statistics Offcice.

- strong incentives to keep costs dynamics at slower rate than inflation, in order to get extra benefit, for the case of those costs that are not subject to annual adjustment;
- for the part of those cost that are subject to annual adjustment, incentives to operate efficiently are rather weak, since there are no possibilities to retain extra benefit for the entity.

46. Some **aspects of RAB** include:
    - the concept of regulatory asset base (RAB) – the value of fixed assets and intangible assets, requested for the provision of a relevant regulated service by an entity, and which is directly or indirectly allocated to the regulatory service;
    - the value of the RAB: in calculations it is used the residual value at the end of the year; during revisions, the value is increased by new investment and reduced by yearly respective depreciation (amortization);
    - Limitations of long-term asset allocation onto regulated business units and regulated services:
        - value of development activities, before start of exploitation of the assets,
        - value of prestige,
        - value of investment asset,
        - value of financial asset,
        - value of suspended taxes,
        - change of value of an asset (any category) due to revaluation of assets,
        - value of unfinished construction, value of non-used asset, reserved asset,
        - value of asset or share of value of asset, established at the expense of EU structural funding dotation, and subsidies,
        - value of asset that is exploited, however, not presented in the balance sheet of the entity.
47. Some **featuring characteristics** of the Methodology, for the purpose of delivering the complete view[39], shall be mentioned:
    - **Loss of drinking water up to inlet into a building** – difference between the amount of water extracted and the amount of drinking water supplied to consumers and subscribers, due to water loss in reservoirs, water processing installations, water supply network;

[39] Respecting the discussion with MDI local experts, on 12th-14th October, 2015.

- **Loss of drinking water in the building's inside system** – difference between the amount of the drinking water supplied to a building and the amount of drinking water sold to consumers and subscribers of that building;
- **Variety of consumers' categories** include:
    - Consumers:
        - Purchasing drinking water and sewerage treatment services at the joint water accounting unit on the inlet into a building;
        - Purchasing drinking water and sewerage treatment services in the apartments, where (i) a meter is installed, (ii) a meter is not installed;
        - Purchasing drinking water and sewerage treatment services at the inlet of individual houses or other family-purpose buildings, where (i) a meter is installed, (ii) a meter is not installed;
        - Purchasing sewerage transportation by decontamination vehicles;
    - Subscribers:
        - Seasonal – those consuming not less than 80% of annual drinking water consumption over 4 months in turn;
        - Subscribers, purchasing sewerage transportation by decontamination vehicles;
        - Subscribers, purchasing drinking water for commercial purposes (heating and for hot water);
        - Subscribers, purchasing drinking water for usage purposes;
        - Subscribers, purchasing drinking water for commercial purposes (bottling and selling);
        - Subscribers, purchasing services of surface runoff treatment.

48. It is important to notice, that along the Methodology, which is the main document providing rules for pricing water and sewerage services, there are used the following specific methodologies:

- Methodology for establishing prices for specific and extraordinary polluted wasted water treatment service (mostly applicable for industrial consumers),
- Methodology for establishing prices for sludge treatment in individual technological phases,
- Methodology for establishing payment for connection of new users to the infrastructure of drinking water public supply and sewerage treatment,

- Methodology for establishing prices for temporary connection to and disconnection from the infrastructure of drinking water public supply and sewerage treatment.

Table #3. **Groups of costs to be recognized, by entities engaged in drinking water supply and sewerage activities, for Drinking water business unit, Sewerage treatment business unit, Sales business unit**

#	Group of costs
1.	**Costs to purchase drinking water**
2.	**Costs to purchase sewerage treatment services**
3.	**Costs of electricity**
4.	**Costs of technology materials, including technological fuel for sludge drying**
5.	**Costs of fuel**
6.	**Depreciation / amortization**
7.	**Costs for maintenance and for exploitation materials**
8.	**Costs for outsourced services and works**
8.1.	Maintenance/repair works
8.2.	Transportation services
8.3.	Laboratory services
8.4.	Banking services
8.5.	Telecommunication services
8.6.	Insurance services
8.7.	Legal and consultation services
8.8.	Administration services for consumers' payments
8.9.	Metrological verification and exchange of meters
8.10.	Other services
9.	**Costs for heating**
10.	**Costs for personnel**
11.	**Costs for taxes**
11.1.	Tax for state natural resources
11.2.	Tax for environment pollution
11.3.	Tax for (compulsory) social security
11.4.	Tax for state land rent
11.5.	Tax for real estate
11.6.	Tax for state guarantee fund
11.7.	Taxes other
12.	**Costs for rent / concession the water and sewerage property**
13.	**Costs financial**
13.1.	Interests for credits
13.2.	Fines, penalties
13.3.	Other financial costs
14.	**Costs other**
14.1.	Personnel training, certification
14.2.	Work safety

14.3.	Stationery costs, post
14.4.	Bills' submission, contract conclusion
14.5.	Advertising, marketing, informational activities, web site support
14.6.	Support, charity, education
14.7.	Bonus (tantième)
14.8.	Membership, entrance fees
14.9.	Representation
14.10.	Costs for long-term asset liquidated, written-off, preserved, being at reserves
14.11.	Doubtful debts, bad debts
14.12.	Provisions
14.13.	Other costs

Incentive based regulatory elements in Latvia, by SPRK. Drinking Water Supply and Sewerage Utilities

49. The Methodology for the Calculation of Tariffs for Water Management Services (thereafter – The Methodology for the Latvian chapter) is the guiding document for SPRK to determine tariffs for a variety of district water services, including:
    - **Water production**, i.e. for the abstraction, accumulation and preparation of water for the use prior to its delivery to the water supply network;
    - **Water supply**, i.e. for water supply from the delivery site in the water supply network to the service customer;
    - **Water management services**, i.e. for water production together with water supply;
    - **Wastewater collection**, i.e. for collection and drainage of wastewater to wastewater treatment plants;
    - **Wastewater treatment**, i.e. for wastewater treatment and drainage in surface water bodies;
    - **Sewerage services**, i.e. for wastewater collection together with wastewater treatment[40].
50. The Methodology works and SPRK respectively establishes tariffs for those entities whose annual sales exceed 100.000 m^3. It is to be noticed, that in the case the annual amount of water supplied and/or the annual amount of wastewater collected do not exceed 100.000 m^3, respectively the entity is established with tariff for Water management services[41] and/or Sewerage services[42].
51. The general principle of the Methodology is the establishment of the tariffs to cover costs necessary for effective service provision.
52. The methodology provides rules for calculation the tariffs in "cost-plus" manner, including the following provisions:
    - the entity submits to regulator the draft tariff, information on the costs included in the current (effective) tariff, the actual costs of the preceding year;

[40] If wastewater collected from cesspools constitute more than 10% of the quantity of the collected or treated (or collected and treated) wastewater in total, the entity may calculate an individual draft tariff for the collection or treatment (or collection and treatment) of the wastewater collected from cesspools for such wastewater; in such case the transportation expenditure of the wastewater collected from cesspools shall respectfully not be included in the costs of other services.

[41] Not necessary to separate into Water production and Water supply.

[42] Not necessary to separate into Wastewater collection and Wastewater treatment.

- the entity forecasts the costs budget of the service in question and uses the forecast for the calculation of the draft tariff;
- the entity forecasts volumes of sales of the service in question and uses the forecast for the calculation of the draft tariff;
- the entity makes forecast for a year time bases;
- the entity forecasts future costs for service provision as a sum of depreciation costs, operating expenses, taxes;
- the entity includes interest payments:
    - of a long-term credit (5 years and more), if the long-term credit is used for the establishment of new fixed assets for the provision of the water management service;
    - of a short-term credit (up to 5 years), if the relevant credit is related to the creation of new fixed assets and attraction of monetary funds from a State, local government, foreign, European Union, another international organization or institution is intended;
- the entity may include the repayment of the principal sum[43] of a long-term credit (5 years and more);
- the profitability of the entity for shall not exceed 7% from the costs of the provision of the water management service within an operating year, and it is expressed as the formula provides[44]:
    - $R = \frac{I_r}{I_P} = \frac{I_r}{I_{D+I_O+I_T+I_k+I_r}} \leq 7\%$,

      where:

      R – profitability,

      I_P– revenues to be included into tariff,

      I_r– profit to be included into tariff,

      I_D– depreciation cost to be included into tariff,

[43] In this case, the depreciation of the fixed assets purchased for the relevant credit throughout the use of the fixed assets is not included in the draft tariff, ensuring individual accounting of such fixed assets in the accounting system.
[44] In fact, the formula limits profit to 7% of the yearly revenue from certain activity, however, this does not hurt the general idea of limitation to 7%.

I_O– operating costs to be included into tariff,

I_T– taxes to be included into tariff,

I_k– interest payments of long-term credits and repayment of the principal sum to be included into tariff.

- the profit of the entity shall be regarded as the resource necessary for operational reserves and attraction of current assets.

53. In practice, SPRK at setting tariffs for the entity, assesses, within the framework, the dynamics of the change of amount of each cost position forming a tariff, and quantities of different services in question.
54. However, certain **specific provisions** of the Methodology provide **clear incentives for effectiveness**:
    - **"freezing period" of the established tariff** - the once established tariff is in place for as long as a revised tariff arrives;
    - revision of the established tariff is started when:
        - the volume of the services used for calculation of the existing tariff change by 10%[45];
        - the costs included in the calculation of the existing tariff change by 5%[46];
    - this "freezing period" provides incentives to the entity operate more efficiently in the case of the falling demand not to make (or at least minimize) financial losses, and to have net positive gains depending on its additional efforts to operate efficiently in the case of increasing demand;
    - respectively the same way "freezing period" impacts when costs vary, i.e. at the time of increasing costs, the entity is incentivized to operate efficiently not to make (or to minimize) loss, and at the time of decreasing costs, the entity is incentivized to operate efficiently to enhance positive extra benefits;
    - **possibility to use return on capital rather than of return on costs** - the entity might choose using return on capital option, instead of using return on costs, in case:

[45] The established tariffs is in effect as long as entity supplies volumes within the range of +/- 10% , if compared to the volume supplied at tariff setting period.

[46] The established service tariff is in effect as long as entity incurs costs within the range of +/- 5% , if compared to the costs established at current tariff.

- the entity's balance includes water-supply and drainage networks, the age of which exceeds 40 years, and
- the total proportion of such networks exceeds 50% from all water supply and drainage networks of the entity;
- if the entity opts to use return on capital alternative, the entity is prohibited to:
  - additionally include return on costs[47],
  - include interest paid on long-term and/or short term credits,
  - include the repayment of the principal sums of long-term credits;
- return on capital is established by SPRK, as RAB multiplied by WACC;
- information on the planned (annual) amount of investments and the investments actually made during the preceding period is supplied to SPRK by the entity;
- the return on capital option provides direct and powerful incentives to entities to invest into infrastructure, since profits (in monetary terms) depend directly on the size of capital invested.

55. Some **aspects of RAB** include:
    - the definition of the term: regulatory asset base (RAB) – the value of fixed assets and intangible investments owned and leased by an entity, which are attributable to the regulatory service, as well as the value of stocks;
    - the value of the RAB: in calculations it is used the residual value of the balance sheet at the end of the year from the financial statement of the previous year;
    - limitations on the RAB: it is not included into RAB financial investments, amounts receivable, securities, participating interest in capitals, monetary instruments, accumulated supplies for sale, as well as the part of the fixed asset value, which is financed using financial assistance or financial aid of a State, local government, foreign state, European Union, other international organization and institution;
    - limitations on the revaluation: the results of the fixed assets revaluations carried out up to 1 January 2008 are taken into account, and the results out of after 1 January 2008 are not included into the value of the RAB;
    - limitation for efficiency: the balance sheet value of the fixed assets, which are not efficiently used in the provision of services, are not be included in the RAB or are partially included

[47] Profitability of 7% mentioned above.

therein, and the depreciation of the relevant fixed assets is not be included or is partially included in the draft tariff;

56. Some featuring characteristics of the Methodology, for the purpose of delivering the complete view[48], shall be mentioned:

- **Supply of water** is considered as **up to the meter for the commercial accounting**, which is installed in a joint water accounting unit on the inlet into a building, group of buildings, structure or up to the inlet into a building, group of buildings, structure;
- **Collecting of wastewater** is considered as the collection **in a manhole**, to which the sewerage networks owned, possessed or used by a Merchant are connected;
- **Water losses** – **do not** include **losses** incurred **after commercial accounting meter** at the inlet of the building[49] and is considered as "the difference between the quantities of abstracted water, supplied to the water-supply network and supplied to customers by a Merchant, which includes the losses related to the liquidation of emergency situations and servicing of networks, the consumption related to the fire-fighting needs, measurement errors emerging as a result of differences between the quantity of abstracted water and supplied to customers, the losses related to inaccurately accounted quantity of water supplied to customers, excluding the water consumption for technological needs".

[48] Respecting the discussion with MDI local experts, on 12th-14th October, 2015.

[49] Losses incurred in the inside of the building systems do not account as water losses; and the costs related to water losses in the internal water-supply of buildings or structures do not enter the tariff.

Incentive based regulatory elements in Estonia, by Konkurentsiamet.

Drinking Water Supply and Sewerage Utilities

57. The Temporary Water Service Pricing Arrangements and Conditions (thereafter – The Methodology for the Estonian chapter) is the guiding document for Estonian Competition Authority (thereafter – CA for the Estonian chapter) to determine tariffs for the following variety of district water services, including:
    - **Water supply**,
    - **Sewerage treatment**,
    - **Rainwater, drainage water, soil and surface water drainage and treatment**,
    - **Subscription** – access to the system; as the Law[50] provides, the price of water services shall not cover the costs, which are covered by the subscription fee.
58. The Law establishes general principles for price calculation, namely:
    - To cover justified operating expenses;
    - To ensure necessary investment for sustainability of systems;
    - To cover necessary needs for environmental requirements;
    - To cover quality and safety requirements;
    - To ensure justified profitability;
    - To enable fulfillment of development / expansion needs.
59. The Methodology uses the **three components** for the establishment of price, i.e. **operating costs, capital costs and reasonable rate of return**.
60. For the calculation of effective operating costs for service provision, CA establishes prohibitions to include certain costs into revenue base, namely:
    - the cost of bad debt;
    - sponsorship, gifts and donations;
    - financial costs;
    - brokerage fees paid by the entity;
    - fines and penalties of the entity;
    - non-operating expenses;
    - income tax expenses;

[50] Public Water Supply and Sewerage Act

- other non-grounded costs or excessive costs - economic analysis for determination of these costs is conducted by CA, inter alia, including benchmarking analysis.

61. For the calculation of rate of return, WACC concept is used, with 50% of equity and 50% of debt capital employed.
62. Some **aspects of RAB** include:
    - RAB definition: as one-time costs of regulated assets for the acquisition and improvement;
    - RAB concept includes assets employed to provide regulated services and associated Working Capital;
    - RAB does not include: (i) non-used for the regulated activity assets; (ii) long-term investment to other entities; (iii) intangible assets (except software, programs, licenses); (iv) grant aid financed asset; (v) consumer connection charges paid; (vi) non-justified investment;
    - the value of the RAB: in calculations it is used the residual value at the end of the year.
63. The **incentive elements** under Estonian way of regulation include:
    - To draw factual costs lower than the established effective costs are, in order to benefit with extra return;
    - To employ more efficient structure of capital than the one used for WACC calculation;
    - To make extra investments into regulated activity to ensure extra return.

Incentive based regulatory elements in Lithuania, by VKEKK. District Heating

64. The Methodology on Price setting for District Heating (thereafter - the Methodology for the Lithuanian chapter) works towards all entities active in district heating sector, that are regulated, however, the public body (and accordingly procedure) taking decision on individual price establishment is different – VKEKK takes decisions for those with annual sales of 10 GWh or more[51], and municipal Councils take decisions towards those entities of smaller size. However, the regulatory rules to come to the final price formula shall be applied in very close manner (with regards to contents of the price), therefore below there will be taken a unified approach.
65. The Methodology is the guiding document for VKEKK to determine tariffs for the following variety of district heating services, including:
    - **Heat production** – including purchases from independent producers; established as the fixed component of the price and the varied component of the price;
    - **Heat transmission** – established as the fixed component of the price and the varied component of the price;
    - **Heat sales** – established as the fixed component of the price solely.
66. Generally, the Methodology lay on two basic principles – principle of "mandated costs" (by the regulating institution) and "established efficiency target" (by the regulating institution as well), which imply elements of incentive regulation. In Lithuanian practice, and for variety of reasons, regulation of district heating companies is rigid and incentives have a limited space to be applied.
67. The Methodology instructs to conduct **accounting separation** by regulated entities, and foresees **ABC model**[52] for accounting separation. Accounting separation model provisions request the entities:
    - to allocate revenues, costs and long term and short term assets into separate into 8 business units:

[51] Also, for those that are independent suppliers and produce +50% of heat in one closed system (Methodology of 2009); for those independent producers that are regulated by individual reasoned decision of VKEKK (Methodology of 2013)

[52] Activity Based Costing

- heat generation, including purchases, business unit - within this business unit, the following services shall have separated accounts: (i) heat (product), (ii) heat in cogeneration plants, (iii) provision of reserves' capacity, (iv) other products (services);
- heat transmission business unit – within this business unit, the following services shall have separated accounts: (i) transmission over centralized heating system network, (ii) balancing within the centralized heating system network, (iii) other products (services);
- sales and retail services business unit;
- hot water supply business unit - within this business unit, the following services shall have separated accounts: (i) hot water supply; (ii) temperature up-keeping; (iii) maintenance of metering devices; (iv) other products (services);
- heating and hot water inside-building systems maintenance business unit - within this business unit, the following services shall have separated accounts: (i) current maintenance of heating and hot water inside-building systems; (ii) reconstruction of heating and hot water inside-building systems; (iii) other products (services);
- environmental obligations, established under EU legislation, implementation business unit;
- other regulated activity business unit – regulated by VKEKK activities under other Laws, but not under Law of District Heating; every regulated activity shall have a separate business unit;
- non-regulated activity business unit – neither under the Law of Drinking Water, nor under other Laws; all activities shall be collected in this business unit as one;

- to conduct direct allocation of revenue, referring to billing system, to business units and relevant services within;
- to conduct allocation of long-term assets, to business units and relevant services within:
  - directly, when a long-term asset is used for provision of a certain service;
  - indirectly, only if direct allocation is not possible and long-term asset is used for provision of several services (joint usage), to conduct allocation of long term asset among different services accordingly to the extent of the asset is used for provision of the service in question;
  - proportionally, when long-term asset is used for general activities and is not related neither directly nor indirectly to any particular service, the allocation of such a long-

term asset is conducted proportionally to the value of previously directly and indirectly allocated assets' value;

- to group all the costs into the following groups:
  - costs for heat purchasing,
  - costs of fuels for heat generation,
  - costs of electricity for technological needs,
  - costs of water for technological needs,
  - costs for acquiring emission allowances,
  - depreciation (amortization) costs,
  - costs for maintenance and current repairs,
  - personnel costs,
  - taxes, financial costs,
  - administration costs,
  - sales and marketing costs,
  - lease and concession costs,
  - other allocative costs,
  - other non-allocative costs;
- to conduct allocation of costs to business units and relevant services within:
  - direct allocation – when the arise of the cost and to certain amount is due to provision of certain service;
  - indirect allocation – when arise of the cost is due to provision of several services and / or due to inside process or group of inside processes; cost drivers shall be used for indirect allocation of costs;
    - the following processes shall be used for allocation of indirect costs: (i) infrastructure management and exploitation activities' group; (ii) infrastructure development activities' group; (iii) service provision activities' group; (iv) customer service activities' group; (v) emergency activities' group; (vi) billing and collection activities' group; (vii) transport management activities' group; (viii) material supply activities' group; (ix) personnel management activities' group; (x) other;
  - proportional allocation – when arise of the cost is due to general support activities of the entity, to ensure continuity, safety and stability of the entity's organizational

activity; costs under proportional allocation are limited to 10% of costs allocated directly and indirectly; the allocation is conducted proportionally to the value of previously directly and indirectly allocated costs;

- non-allocation – when costs are one of the following: bad debts, fines, penalties; support, charity, education; bonus (tantième); membership, entrance fees; interest on credits; representation; advertisement, marketing, informational activities, except the portion obligatory under legal requirements; costs of concession, lease, and other costs that are not characteristic to if the activity was conducted by the owner; costs for long-term asset liquidated, written-off, preserved, being at reserves; construction on going; depreciation (amortization) for the share financing the assets with EU funding, subsidies, dotation, positive trading of emission allowances; depreciation on asset share paid by consumers connecting; depreciation (amortization) for the share of asset revaluation; share of depreciation of asset developed without coordination to VKEKK and/or municipal council; depreciation (amortization) on the asset under development before exploitation is started; depreciation (amortization) for financial asset, investment asset, prestige; depreciation on the share of generation capacities exceeding maximum load capacity and reserves' capacity.

68. The Methodology provides **long-term[53] base price** (3-5 years) **mechanism with** mandatory **annual revision**.
69. While setting **long-term base prices**, it shall be respected:

- AT THE FIXED COSTS LEVEL:
  - The factual amount of costs allocated to relevant business units and relevant services over the last three years;
  - The factual amount of provided relevant services over the last three years;
  - The values of relevant indicators determined by comparative analysis:
    - If efficiency of the relevant group of entities is higher than the efficiency of the entity in question, in this case the entity is established with the amount of particular costs, corresponding to the efficiency of his group, taking due consideration to the factors provided in the Description of comparative analysis, taking due consideration to the measures provided by the entity in the action

[53] Long-term base price if established for 3 years.

plan to reduce those costs, taking due consideration to the time period for the entity to achieve the group efficiency level of the particular indicator;

- If the efficiency of the entity in question is higher than efficiency of the relevant group of entities, the factual amount of particular costs of the entity is established;
- The mathematical expression of the incentive established by the Methodology is the following:

$$C^E_{i,t+1} = C^E_{i,t}\,, if\ C^E_{i,t} < C^B_{i,t}$$

$$C^E_{i,t+1} = C^B_{i,t}\,, if\ C^E_{i,t} > C^B_{i,t}$$

$where$

$C^E_{i,t+1}$ – particular cost i for the entity E for the next period t+1,

$C^E_{i,t}$ - particular cost i for the entity E for the last period t,

$C^B_{i,t}$ - particular cost i according to benchmarking result for the last period t.

- The cost types, that are subject to this efficiency test[54], are the following: (i) maintenance / repair works and materials for exploitation, (ii) administrative, marketing and other allocative costs; (iii) personnel, salaries;

- The planned changes in the operations of the entity during the first year of the regulatory period; overall changes expected after the long-term activity and investment program is implemented, with respect to cost amount and rate of return;
- The significant circumstances occurred after the submission of the project to VKEKK;
- The reasons, explained by the entity, of the cost changes;
- Results of regulatory audit, conducted by VKEKK, if such an audit has taken place;
- The general formula of the fixed costs to be included into the annual revenue amount for the next regulatory period:

$$FC_y = \sum_{i=1}^{n} C_{y,i} + R_y \quad ,$$

[54] Indicators of comparative analysis, estimated by Commission and announced publicly, are the basement for establishment of assignments for efficiency for en entity in question and for determination of relevant costs, while conducting long-term base price setting and variable component of the price setting process.

$where$

FC_y – annual amount of fixed costs to be included into price of a relevant service y, at the next regulatory period; this equals to annual amount of revenues to be collected at provision of service y, at the next regulatory period;

y – relevant service;

R_y – annual amount of return on capital to be included into price of a relevant service y, at the next regulatory period;

$C_{y,i}$ – annual amount cost i to be included into price of a relevant service y, at the next regulatory period, i.e. depreciation (amortization); purchasing of reserves' capacity from third parties; maintenance and current repairs; personnel; taxes; financial costs; administrative costs; marketing and sales; other allocated costs.

- The established WACC (under structure of capital at 40% equity and 60% debt); VKEKK announces input data for WACC calculation on annual basis;
  - Having limits in the Law at 5% for WACC, the Methodology of 2009 provided, that interest on bank credits should be included into operational mandated costs base, thus leaving 5% as return on the entire capital employed;
  - The Methodology of 2009, taking due respect to the complicated situation of 2009-2013 period, mandated entities to have extra 6% for 7 years on investment into asset using renewables instead of natural gas;
  - The Methodology of 2013 removed these extra provisions, however, foreseen that if an entity has shortage of capital to invest, for limited period and to reasonable amount extra profit targeted to financing particular coordinated project is included into requested annual revenue; the individual approach targeted specific exceptional needs[55];
- AT THE VARIED COSTS LEVEL:
  - The optimal fuels' structure of the entity over the relevant period, which (the structure) ensures the least possible costs (in value terms) for unit of energy to produce, also, which (the structure) composed taking due account to technical possibilities of the relevant

[55] This provision was removed in autumn 2015, and for the time being the WACC is calculated in classical way.

centralized DH system, including working schedule of power plants and boilers, installed capacities, availability of fuel types, and delivering priority to waste incineration and usage of renewable resources;

- The planned changes in the operations of the entity during the first year of the regulatory period; overall changes expected after the long-term activity and investment program is implemented, with respect to cost amount and rate of return;
- The planned demand over the respective period;
- The planned losses;
- The limitations on prices of fuel;
- Aforementioned comparative analysis towards the costs of electricity and water for technological needs, but also, other varied costs necessary for the production of heat[56];
- The general formula of the varied costs to be included into the annual revenue amount for the next regulatory period:

$$VC_y = \sum_{i=1}^{n} C_{y,i} \quad ,$$

$where$

VC_y – annual amount of varied costs to be included into price of a relevant service y;

y – relevant service;

C_i – annual amount of varied cost i , i.e. cost for heat purchases, cost for fuels for heat generation, cost for electricity and water for technological needs, other cost allocated, cost for emission allowances.

- The general formula of price determination:

$$K_y = {[FC_y + VC_y]}/{Q_y} \quad ,$$

where

Q_y - annual quantity of a relevant service y, at the next regulatory period;

[56] Amount of losses, which is important at establishing the varied costs, is calculated considering several circumstances: first, initial normative status, as legal acts provides, second, comparative analysis results (establishing efficiency target), and third, projecting the impact of planned investment program over the future regulatory period.

K_y - price for a relevant service y, at the next regulatory period.

- Example of base formula for DH transmission service:
  - One-block price case for DH transmission service:

$$T_{HT} = \frac{[FC_{HT} + VC_{HT}]*100}{Q_{HR}} = \frac{FC_{HT}*100}{Q_{HR}} + \frac{[C_{TL} + C_{E,HT} + C_{W,HT} + C_{O,HT}]*100}{Q_{HR}}$$

Expressed as number, EUR/kWh

Expressed as formula, EUR/kWh

  - Two-blocks price case for DH transmission service:

$$T_{HT,KD,dv} = \frac{VC_{HT}*100}{Q_{HR}} = \frac{[C_{TL} + C_{E,HT} + C_{W,HT} + C_{O,HT}]*100}{Q_{HR}}$$

Expressed as formula, EUR/kWh

$$T^{1}_{HT,MU} = \frac{FC_{HT}*8760}{Q_{HR}*12}$$

Expressed as number

70. Summarizing the **incentives** package **at the phase of long-term base price establishment:**
    - strong incentives to reduce those entity's costs that are above the benchmarked level, in order not make loss (or rather not to cover those cost difference out of entity's return);
    - incentives to reduce costs that are below the benchmarked level and therefore established as they are at factual size, to make extra benefit;
    - strong incentives to reduce percentage of losses down to relevant established levels, in order not make loss (or rather not to cover those cost difference out of entity's return); extra reduction of losses (below limiting level) during regulating period produces extra benefits for the entity;
    - incentives to invest into infrastructure development using more profitable financing structure that the established by VKEKK, since extra capital invested generates extra return;
    - purely economic incentives to invest into infrastructure development using EU funds and other subsidies are weak, since no return is provided for the share of subsidies' capital.
71. While conducting **annual revision of base prices**, the following factors are respected, on the fixed component of the price:

- Efficiency coefficient, estimated as half on annual inflation rate[57], but not exceeding 3%; efficiency coefficient is applied to total amount of costs, excluded[58] depreciation (amortization) costs and return on capital;
    - The inflation coefficient is established according the formula:

$$I_{EF,y} = \sum_{y=2,\dots 5} \left[\frac{CPI_y - 1}{2}\right]$$

$where$

$I_{EF,y}$ – Efficiency coefficient for year y,

CPI_y – Consumer price index for year y.

    - The price change due to efficiency coefficient is calculated according the formula:

$$\Delta T_{EF,i,y} = \frac{\left(FC_i - C_{DA,i} - C_{INT,i} - JR_i\right)*100}{Q_i} * I_{EF,y}$$

$where$

$\Delta T_{EF,y}$ – price, fixed component, change due to Efficiency coefficient for year y,

FC_i – fixed costs for service i,

$C_{DA,i}$ – depreciation (amortization) costs for service i,

$C_{INT,i}$ – interest costs for service i, in the case the long-term base price is established under the Methodology of 2009,

JR_i – return on capital for service i,

Q_i – quantity of service i.

- Difference in the volume forecasted and the volume factual, of sold services – is reflected in revision; the following formula is used for the purpose:

[57] Inflation rate is taken as CPI [Consumer price Index], published by National Statistics Offcice.
[58] If under review are prices established according the Methodology of 2009, costs of interest on credit are deducted as well.

$$\Delta T_{Q,i,y}^{HR} = T_{PD,i} * I_{Q,y}^{HR} = T_{PD,i} * \left[1 - \frac{Q_{HR,i,y} - Q_{HR,NS,y}}{Q_{HR}}\right]$$

where

$\Delta T_{Q,i,y}^{HR}$ – price, fixed component, change due to quantity coefficient for year y,

$T_{PD,i}$ – long-term base price, fixed component, for service i,

$I_{Q,y}^{HR}$ – quantity coefficient,

$Q_{HR,i,y}$ – quantity factually sold, for year y,

$Q_{HR,NS,y}$ – quantity factually sold to newly connected consumers/systems, for year y,

Q_{HR} – annual quantity for sales established at long-term base price decision.

- Difference in depreciation (amortization) costs due to investment into asset newly introduced into exploitation;
- Difference in the forecasted and factual return on capital due to extra invested capital;
- Difference in the forecasted and factual return on capital due to the changed price of debt capital and the changed price of share capital;
- Difference in factual and forecasted return on capital, due to other reasons, when the difference is greater than 1 percentage point;
- Cogeneration risk sharing coefficient[59];
- Result of the entity's activity of Balancing the system;
- Other factors influencing that are not under control of the entity;
- Positive result of the activity of trading emission allowances;
- Results of relevant regulatory audit conducted by VKEKK, if such an audit has taken place and produced results to be reflected[60].
- Example of reviewed price formula for DH transmission service:

[59] Comes from Cogeneration methodology: If an entity's operation in cogeneration electricity ("commercial") results with any positive or negative return, 40% of this result is accumulated by heat pricing, when the plant in question is paid off, and 20% of this result is accumulated by heat pricing, when the plant in question is not paid off yet.

[60] The general principle is the following - if the entity has breached legal requirements and as a result has benefited out of this breach, the gains are "returned" to consumers in decreasing price; if the entity the entity has breached legal requirements and as a result has incurred losses, these losses are disclosed and stated by VKEKK, but not included into price revision, i.e. the losses "stay with the entity".

- One-block price case for DH transmission service:

$$TC_{HT,PD,y} = T_{HT,PD} + \Delta T_{EF,HT,y} + \Delta T^{HR}_{Q,HT,y} + \Delta T^{INV}_{DA,HT,y} + \Delta T^{INV}_{JR,HT,y} + \Delta T^{WACC}_{JR,HT,y} - \Delta T_{HB,HT,y} + \Delta T_{X,HT,y} - \Delta T^{R}_{JR,HT,y}$$

where

$TC_{HT,PD,y}$ – reviewed transmission price, fixed component, for year y,

$T_{HT,PD,i}$ – long-term transmission base price, fixed component, for service i,

$\Delta T_{EF,HT,y}$ – Δ transmission price, fixed component, change due to Efficiency coefficient,

$\Delta T^{HR}_{Q,HT,y}$ – Δ transmission price, fixed component, change due to quantity coefficient,

$\Delta T^{INV}_{DA,HT,y}$ – Δ transmission price, fixed comp., change due to extra depreciation on extra investment,

$\Delta T^{INV}_{JR,HT,y}$ – Δ transmission price, fixed comp., change due to extra return on extra investment,

$\Delta T^{WACC}_{JR,HT,y}$ – Δ transmission price, fixed comp., change due to changes in debt capital price and equity capital price,

$\Delta T_{HB,HT,y}$ – Δ transmission price, fixed component, due to result of system balancing activity,

$\Delta T_{X,HT,y}$ – Δ transmission price, fixed component, due to non-controllable by the entity factors,

$\Delta T^{R}_{JR,HT,y}$ – Δ transmission price, fixed comp., change due to direct considerations (result of the activity of trading emission allowances; results of regulatory audits; etc.).

- Two-blocks price case for DH transmission service – have the same formula, however, since initially long-term base price is calculated as EUR/month[61], the deltas of the price review are calculated as well in EUR/month form[62].

[61] Another in the Methodology foreseen option was to calculate as EUR/month/kW
[62] Matter of consistency.

72. While conducting **annual revision of base prices**, the following factors are respected, on the varied component of the price:
    - Factual changes in ratio of generated heat and purchased heat;
    - Factual growth of renewable share in total fuels' structure (comparative fuels input, $kg_{oil.equivalent}$/MWh, and comparative electricity consumption, kWh/MWh, are reviewed in this case);
    - Factual change in total fuels' structure[63], comparative fuels input, and comparative electricity consumption, if a new system is connected;
    - Factual changes of prices of electricity and water for technological needs;
    - Other factors influencing varied costs that are not under control of the entity;
    - Results of relevant regulatory audit conducted by VKEKK, if such an audit has taken place and produced results to be reflected;
    - Example of reviewed price formula for DH transmission service:

$$T_{HT,KD,y} = \frac{\left(C_{TL} + \sum\left(q_{E,HT} * p_{E,HT,y}\right) + \sum\left(q_{W,HT} * p_{W,HT,y}\right)\right) * 100}{Q_{HR}}$$

where

$T_{HT,KD,y}$ – transmission price, varied component, on year *y*;

$q_{E,HT}$ – quantity of electricity for technological needs, for transmission;

$p_{E,HT,y}$ – electricity price on year *y*;

$q_{W,HT}$ – quantity of water for technological needs, for transmission;

$p_{W,HT,y}$ – water price, varied component, on year *y*;

C_{TL} – total cost to produce heat for established technical losses and established administrative purposes;

Q_{HR} – annual quantity of heat to be sold, established at long-term base price decision.

[63] Fuel price if left at open position, when establishing prices for long-term base, and for annual reviewed. However, it does not mean, that the entity is left unattended – at price annual review, the factual data of fuels consumption quantity (according to demand, established comparative consumption, structure, etc.) and fuel price are analyzed. If there are divergences, these are reflected in reviewed price. Regarding the price for fuels – the limits on comparative / benchmarking base are established for every type of fuel, and reasoned opinion of the entity might influence tolerance up to 10% of the fuel-price-limit.

73. Summarizing the **incentives** package **at the phase of base price annual revision**:
    - strong incentives to keep fixed costs dynamics at slower rate than inflation, in order to get extra benefit – for those cost groups that are not subject to annual review;
    - for the part of those fixed cost that are subject to annual adjustment, incentives to operate efficiently are rather weak, since there are no possibilities to retain extra benefit for the entity;
    - for the varied costs case, entities are left with the incentives to search fuel for price that is below established comparative limit, and avoid at all costs the fuels with price higher than established comparative limit;
    - the practice of freezing the structure of fuels for regulatory base period was present until recently, and this regulatory incentive used to play powerfully on entities to implement fuel conversion investment projects[64].
74. Some **aspects Regulatory Asset Base (RAB)**:
    - the concept of regulatory asset base (RAB) – the value of fixed assets and intangible assets, requested for the provision of a relevant regulated service by an entity, and which is directly or indirectly allocated to the regulatory service;
    - the value of the RAB: in calculations it is used the geometrical average of residual value at the beginning of the regulatory year and at the end of the regulatory year; during revisions, the value is increased by new investment and reduced by yearly respective depreciation (amortization);
    - Limitations of long-term asset allocation onto regulated business units and regulated services:
        - value of development activities, before start of exploitation of the assets,
        - value of prestige,
        - value of investment asset,
        - value of financial asset,
        - value of suspended taxes,
        - value of asset, in the investment was conducted without coordination with VKEKK and relevant municipality council;
        - change of value of an asset (any category) due to revaluation of assets,

[64] The recall of this regulatory practice in Lithuania was due to rapid uncontrollable increase in natural gas prices, and resulting windfall profits for entities with frozen structure of gas fuels in place and practically using 3-4 times cheaper renewables. On the other hand, the usage of renewables has reached the “no-turn” point, and the regulatory incentive has lost its actuality.

- value of unfinished construction, value of non-used asset, reserved asset,
- value of asset to the extent that consumer have paid for their connections,
- value of asset or share of value of asset, established at the expense of EU structural funding dotation, and subsidies, also, using positive results of trading emission allowances;
- value of generation asset that is in excess to the max demand of the system capacity and reserves capacity.

75. Some featuring characteristics of the Methodology, for the purpose of delivering the complete view[65], shall be mentioned:
    - **Point of heat sale-purchase** – point of manifold, where the entity sells the heat to consumer; **Point of heat supply-consumption point** – point of manifold, where the entity delivers the heat to consumer;
    - **Technological losses at heat transmission** – difference between the quantity of heat, supplied into the network by the entity, and the quantity of heat, consumed by consumer under the reading of thermal metering devices, installed at the points of heat sale-purchase. The difference is due to the heat lost thought manifold surface and leaked heat carrier;
    - **Price differentiation** – the entity has the right to differentiate all the price components according to (however, non-discrimination requirement and cross-subsidization prohibition are clearly in place):
        - different heat supply systems;
        - consumer groups;
        - point of sale-purchase of heat;
        - supply-consumption point;
        - ownership of heat point[66];
        - heat consumption scale;
        - supply reliability level;
        - consumption seasonality;
        - consumption periodicity;
        - other criteria;

[65] Respecting the discussion with MDI local experts, on 12th-14th October, 2015.
[66] тепловой пункт

- **Price blocks** – consumer has an initiative and a right to choose, whether he pays at one-block price either at two-blocks price;
- **Variety of consumers** include:
    - Competitive consumers;
    - Consumers of uninterrupted supply;
    - Consumers of self-sufficient supply;
    - Consumers of regular supply by centralized district heating system.

76. It is important to notice, that along the Methodology, which is the main document providing rules for pricing district heating services, there are used the following specific methodologies:
    - Methodology for price setting for hot water;
    - Methodology for price setting for maintenance of hot water meters;
    - Methodology for heating price setting for competitive consumers[67];
    - Methodology for cost separation between heat and electricity, applied for cogeneration plants.

[67] Incorporated into the Methodology of 2013 edition.

Incentive based regulatory elements in Latvia, by SPRK. District Heating

77. The Heat distribution service tariff calculation methodology (thereafter – The Methodology for the Latvian chapter) is the guiding document for SPRK to determine tariffs for district heating services, including:
    - **Production of heat[68],**
    - **Heat transmission and distribution,**
    - **Heat sales.**
78. General principles of the Methodology are inscribed in the Law – to cover economically justified public service costs and ensure the profitability of the public service.
79. The Heat Distribution Service Tariff Calculation Methodology (thereafter – The Methodology for Latvian chapter) is very much similar to "cost-plus" type, however, provisions on rate of return calculation are specific.
80. The tariff is calculated taking into consideration yearly data.
81. The Methodology provides rules for calculation the tariffs in "cost-plus" manner, including the following provisions:
    - the entity submits to regulator the draft tariff, information on the costs included in the current (effective) tariff, the actual costs of the preceding year;
    - the entity forecasts the costs budget of each service separately and uses the forecast for the calculation of the draft tariff;
    - the entity forecasts volumes of sales of the service in question and uses the forecast for the calculation of the draft tariff;
    - some specific provisions are present:
        - the factual interest rate paid by the entity on its credit is the interest rate to be included into the projected tariffs;
        - the entity may include the repayment of the principal sum of a long-term credit (5 years and more);
        - bad debts of consumers are not included into projected tariffs;

[68] Excluding heat generation in cogeneration plants with a total installed electrical capacity of over one megawatt.

- cost projections do not include inflation, fuel and electricity prices, changes in taxes and duties and other state defined payments changes;
- tariff projection does not include neither the value of capital nor depreciation (amortization) cost of asset acquired with financial assistance or financial aid of a State, local government, foreign state, European Union, other international organization and institution; the proportional reduction of value and costs is required;

- the profitability of the entity is established according to the following limitations:

$$R_{max} = \frac{(0{,}126 * k - 0{,}026) * A_G * 100 + (-0{,}247 * z + 0{,}347) * A_T * 100}{A_G + A_T}$$

$where$

R_{max} – maximum profitability,

A_G – generation asset value,

A_T – transmission and distribution asset value,

k – generation profitability coefficient, calculated as $k = \frac{\frac{Heat\ generated}{Installed\ capacity}}{1200}$; if actual value of k is greater than 1, for purposes of profitability value of 1 shall be used;

z – transmission and distribution profitability coefficient, calculated as

$z = \frac{\frac{Losses\ of\ transm.\&\ distribution}{Losses\ of\ transm\&distrib.+Heat\ sales}}{22}$; if actual value of z is greater than 1, for purposes of profitability value of 1 shall be used;.

- The tariff is calculated as sum of varied costs, fixed costs, and net profit divided by amlunt of relevant service.

82. In practice, SPRK at setting tariffs for the entity, assesses, within the framework, the dynamics of the change of amount of each cost position forming a tariff, and quantities of different services in question
83. The Methodology provides the following **incentives for effectiveness**:

- review of tariffs is conducted under the following rules:

- as long as entity supplies volumes within the range of +/- 10% , if compared to the volume supplied at price setting period, the entity shall not approach the regulator with amendments in price;
- as long as entity incurs costs within the range of +/- 5% , if compared to the costs established at price setting period, the entity shall not approach the regulator with amendments in price;

- this “freezing period” provides incentives to the entity operate more efficiently in the case of the falling demand not to make (or at least minimize) financial losses, and to have net positive gains depending on its additional efforts to operate efficiently in the case of increasing demand;
- respectively the same way “freezing period” impacts when costs vary, i.e. at the time of increasing costs, the entity is incentivized to operate efficiently not to make (or to minimize) loss, and at the time of decreasing costs, the entity is incentivized to operate efficiently to enhance positive extra benefits;
- the Methodology states that if entity has implemented efficiency increasing measures and as a result costs decreased by more than 2%, new tariff projection might include the benefit for max 3 years onward.

Incentive based regulatory elements in Estonia, by Konkurentsiamet.

District Heating

84. The Principles of Approval Maximum Price of Heat (thereafter – The Methodology for the Estonian chapter) is the guiding document for Competition Authority (thereafter – CA for the Estonian chapter) to determine tariffs for district heating services.
85. The District Heating Act provides components of efficient pricing for DH services, so that the price for DH shall cover: (i) necessary operating expenses, (ii) necessary investment for operational and developmental obligations, (iii) necessary needs for environmental requirements, (iv) quality and safety requirements, (v) justified profitability.
86. The Methodology used in Estonia is a combination of Incentive type regulation and Rate of Return type regulation, and implies both "RPI-X" features and "cost-plus" features. The costs are intensively regulated by CA, however, the prices are fixed upon request of the entity, but not to certain amount of years, as would be the case for classical "RPI-X" regulation. The entity in question has right to turn to CA for new tariff establishment at any time, for a period up to 3 years.
87. Provisions as for **rate of return regulation** type:
    - The Methodology aims *inter alia* to:
        - enable the entities to maintain their economic and financial sustainability, i.e. to recover operating costs and to finance necessary investments;
        - ensure acceptable return on invested capital for investors;
    - The entity has an obligation to implement its investment program, and CA verifies compliance of the program with its actual implementation;
    - Regulatory accounting separation shall be implemented by the entity:
        - when the entity produces heat in boiler houses or (and) purchase it from other parties the separate accounts are requested for:
            - Production, distribution and sale of heat;
            - Connection to the system;
            - Ancillary (secondary) activity;
        - when the entity produces heat in the process of CNP the separate accounts are requested for:
            - Production of heat in the process of CHP;
            - Production of electricity in the process of CHP;

        - Production of heat with boiler(s);
        - Distribution and sale of heat;
        - Connection to the system;
        - Ancillary (secondary) activity;
    - All the costs belong to the following groups:
        - Non-Controllable – those cannot be affected by economic activity of the entity;
        - Controllable – those that entity can affect through more efficient economic activity;
        - Variable – those that change together with the change of production volume;
        - Operating (excl. capital expenditure) – those that can be affected by more efficient economic activity;
    - The limitations on costs that can be included into tariffs are provided in the Methodology:
        - Depreciation on the asset value, that is paid by consumer connection fees;
        - Allowance for uncollectible accounts;
        - Sponsorship, gifts and grants;
        - Payments to intermediary traders of heat;
        - Expenses related to secondary activity;
        - Changes in the value of assets due to writing off, impairment, etc.;
        - Penalty charges and fines for delay;
        - Other expenses that appeared as non-justified in the economic analysis;
        - Depreciation of the value of asset acquired by the means of grant (for eg., EU funds);
    - The Methodology also establishes limits on Controllable expenses[69]:
        - On Network losses,
        - On Heat production efficiency;
    - Rate of return is established as WACC (under structure of capital at 50% equity and 50% debt); for calculation of equity capital CAPM model is used;
    - The annual revenue size is determined as sum of operational expenses, capital expenditure and justified return (operational profit);
    - The price for a service is the annual revenue divided by annual amount of the service in question.

88. Provisions as for **incentive based regulation** type:

[69] Exact limits and their annual dynamics is provided in the Report "Overview of use of benchmarking results in regulatory process EU countries in water & wastewater and district heating sectors".

- The Methodology states using the principles known under the name of price cap regulation method: the price for the next regulation period is approved on the basis of the price in the previous period, consumer price index and the CA assigned efficiency coefficient or cost saving task (x);
- The efficiency coefficient x has the provision "The value of x is determined by the regulator so that it should create for the company incentives for raising efficiency of its activity during the regulation period (as a rule, encourage cost savings)";
- The Methodology states, that RPI-X regulation system may be applied at the request by an entity;
- Rate of return is established as WACC (under structure of capital at 50% equity and 50% debt); for calculation of equity capital CAPM model is used;
- If the entity opts for RPI-X regulation,
    - the correction might have both increasing and decreasing effect on the maximum price;
    - the correction is calculated once a year;
    - the basis for correction calculation is the difference between the projected and the actual prices in the preceding 12 months;
        - for the variables of the price formula like prices for shale oil, natural gas, network services or purchased heat;
        - not for the variables of the price formula like prices for wood chips, peat and oil shale[70];
        - if structure of fuels used changes, the entity is obliged immediately to submit a new application for price approval;
    - this type of regulation is applied consistently to all future regulatory periods;
- annual corrections of price due to changing quantity of service are made towards operational costs, capital expenditure and justified return in such the way that:
    - the total amount of operational cost / capital expenditure / justified return, established by CA at price approval phase, is fixed,

[70] Wood chips and peat are local fuels, traded under competitive environment; oil shale is administratively regulated fuel.

- changing quantity of sales does not change the total amount of operational cost / capital expenditure / justified return, but changes the operational cost / capital expenditure / justified return per service unit;
- if total amount operational cost / capital expenditure / justified return if higher or lower than the amount established by CA, the established amount of operational cost / capital expenditure / justified return is used for price calculation.

89. The Methodology provides certain incentives for regulated entities:

- take measures to reduce controllable costs to the limit level not to acquire losses (minimum task) and to reduce controllable costs below the limit level in order to get extra benefit (maximum task);
- take measures of efficient operations and ensure the factual operational costs lay below the level of established operational costs size to get extra benefit for the whole duration of the established long-term price;
- invest into tangible asset to get higher justified return on capital;
- use more efficient Capital structure that the one provided by CA.

90. Some **aspects RAB**:

- Definition: RAB "is the fixed assets and the working capital used in the regulatory activity";
- Value of RAB is determined as an average, and includes working capital:

$$RAB = \frac{(RAB_0 + RAB_1)}{2} + WC$$

where

RAB – regulatory asset base to determine rate of return on capital invested;

RAB_0 – regulatory asset base for the start of regulatory period;

RAB_1 – regulatory asset base for the end of regulatory period, and established as RAB_0 plus investment made during the regulatory period minus depreciation(amortization) during the regulatory period minus value of asset written off or sold;

WC – working capital is considered as 5% of the external net turnover in a business year of the entity[71].

- Limitations – RAB does not include:
  - tangible fixed assets used in secondary activity;
  - long-term financial investments, intangible assets[72];
  - tangible assets acquired under grant aid (e.g. under the European Union foreign assistance programs);
  - tangible fixed assets acquired from the fees paid by customers for connecting to the networks;
  - construction-in-progress asset value[73];
  - non-used factually for the regulated activity assets, so called Stranded-assets[74];
  - non-justified investment value;

91. The new reference model[75] for the regulated heat entities, introduced by CA in 2014, developed for a cost-effective district heating system, provides a composite effectiveness measure and a new set of incentives for regulated entities that have no obligation to coordinate their price with CA if the price does not exceed the reference model price.

[71] In the case of the entity participating in integrated group, internal turnover is not included in the accounting of the working capital.
[72] Excluding computer software and program licenses.
[73] The entity is requested to keep separate accounts for the construction-in-progress.
[74] The Methodology provides that the balance sheet of an entity shall be corrected if it becomes evident that RAB includes factually non-used for regulated activity asset or if the value of assets differs remarkably from the value of fixed assets used by similar entities (CA conducts comparison).
[75] Long Run Average Incremental Cost model. Described in greater details in the Report "Overview of use of benchmarking results in regulatory process EU countries in water & wastewater and district heating sectors".

Incentive based regulatory elements in Poland, by URE. District Heating

92. The district heating services' prices are regulated by Decree of Minister of Economy "Rules for the development and calculation of tariffs and settlements of heat supply"[76] (the Methodology thereafter for the Polish chapter).
93. Urząd Regulacji Energetyki provides the following acts:
    - Information on the principles and the method of determining and including return on equity (cost of capital) in the tariffs for heat for the period 2013-2015,
    - Information on the principles and the method of determining and including return on equity (cost of capital) in the tariffs for heat in 2015,
    - Information on the indicators used in determining return on capital in tariffs for heat.
94. General principles of tariff for heat are outlined in the Law. The tariff shall ensure *inter alia*:
    - Covering the justified costs of energy entity's business activity related to generation, processing, transmission, distribution and trade, including justified return on capital employed in such activity;
    - Protecting the customers' interest from an unjustified increase in prices and rates of charges.
95. The Law also instructs URE, annually[77]:
    - to announce average sale prices of heat generated in non-cogeneration units,
    - announce a reference index determining prices of heat from cogeneration.
96. The Methodology provides the following way to determine heat price:
    - SIMPLIFIED MODEL for heat price making:
        - Planned revenue is result of planned volume of sales multiplied by established heat price:

          $P_c = Q_s * C_c$

          $where$

          P_C – planned revenue from the sale of heat for the year of tariff application, PLN,

[76] The Energy Law Act and Decree of Minister of Economy "Conditions for the operation of heating systems" are as well applied to the framework.
[77] Which is done by 31 March.

Q_S - planned volume of heat fed into the district heating network or sold directly to customers for the year of tariff application for given heat source, GJ,

C_C – max heat price for the entity to charge, PLN/J;

- Reference heat price for the year of regulation is derived the following way:

$$C_r = C_{CSn} * X_c$$

$where$

C_r –reference heat price calculated for each source, PLN/J,

C_{CSn} - valid average price of heat, when used the same fuel type, PLN/J,

X_C – valid reference index, for type of fuel;

- Reference index is determined the following way:

$$X_C = (C_{CSn} + k)/\ C_{CSn}$$

$where$

k – increase in cost of unit, derived dependently on the tariff establishment date:

$k = RPI + 2$, if tariff was established before 31 MAR 2011,

$k = (C_{CSn}\ /C_{CSn-1} - 1) * 100 + 2$, if tariff was established between 31 MAR 2011 and 31 MAR 2013 and after 31 MAR 2014,

$k = ((C_{CSn}\ + K_i^{CO2})/C_{CSn-1} - 1) * 100 + 2$, if tariff was established between 31 MAR 2013 and 31 MAR 2014;

- RESIDUAL MODEL for heat price making:
  - Planned revenue at CHP as a result of relevant deductions from annual total volume of revenue:

$$P_C = P_{EC} - (E_S * C_E) - PM_C - PM_Z$$

$where$

P_C – planned revenue from the sale of heat for the year of tariff application, PLN,

P_{EC} – planned joint revenue from the sale of heat and electricity for the year of tariff application, PLN,

E_S – planned quantity of electricity which is to be sold, kWh,

C_E – price of electricity, PLN/kWh,

PM_C – revenues from the sale of property rights from certificates of origin from cogeneration, PLN,

PM_Z – revenues from the sale of property rights from certificates of origin from RES, PLN;

- RPI-X MODEL for annual price recalculations, used in the case of RESIDUAL MODEL (for CHP):

$$C_{Sn} = C_{Sb} * [1 + (RPI - X_r)/100],$$

$where$

C_{Sn} – price after annual recalculation, PLN/kWh,

C_{Sb} – price before annual recalculation, PLN/kWh,

RPI – Retail price index / inflation,

X_r – efficiency factor.

- URE has developed as well a Model, allowing to consider acceptable changes in entity's revenues (sum of justified costs and justified return on capital) from a particular regulated activity, after taking into account RPI factor, variations in fuel costs and the costs of transmission losses:

$$P_{Cn} \leq P_{Cn-1} * \left[1 + \frac{(1-z)*RPI+z*k}{100}\right] \leftrightarrow P_{Cn} \leq [K_u + WACC * WRA] \quad \text{either}$$

$$P_{Cn} = (K_u + u * WACC * WRA * EWA) \leftrightarrow P_{Cn} > P_{Cn-1} * \left[1 + \frac{(1-z) * RPI + z * k}{100}\right]$$

where

P_{Cn} – justified planned revenue from production, transmission & distribution of heat, PLN,

P_{Cn-1} – revenue from production, transmission & distribution of heat for the preceding year, PLN,

z – share of fuel cost in the cost of generation or respectfully share of heat loss cost in the cost of transmission & distribution, published by URE yearly,

k– annual rate of change in the fuel price or respectfully annual rate of change in heat losses, published by URE yearly, %,

K_u – reasonable costs for the relevant service established by URE, PLN,

WRE – value of RAB, PLN,

$WACC$ – weighted average cost of capital, %,

EWA – ratio of effectively used RAB for provision of regulated relevant services, %,

u – ratio of consumer protection, estimated according to special algorithm, and encouraged by URE to fall within the range of +/- 15 %.

- With regard to the model described above, here are the values of coefficients published by URE for 2015:
  - z – share of fuel cost in the cost of generation 0,4746,
  - z – share of heat loss cost in the cost of transmission & distribution 0,2658,
  - k– annual rate of change in the fuel price -0,37%,
  - k– annual rate of change in heat losses +8,12%.

97. The Polish system of regulation provides rich base for incentives, dependently which exactly model is chosen for regulation of the entity in question.
98. Desk research of the legal base shows, that Polish system is less focused with micromanagement issues, and more oriented to general regulatory request of broad touch for operations' efficiency. Some widely observed incentives for extra benefit are present in Polish system as well, namely:
    - incentives to use different (more efficient) capital structure than the one established by URE,
    - incentives to look for cheaper debt capital than established limit by URE,
      - however, the coefficient u[78] reduces those incentives to limited amount,
    - to generate (purchase) heat at factual price lower than the average price,
    - to have losses at lower level than average level.

[78] consumer protection coefficient